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THE PREPARATION AND PRESERVATION OF APPLE CIDER ON THE FARM

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This publication provides information on the preparation and preservation of apple cider for the small orchardist and roadside market operator. Some of this material has been taken from Farmers' Bulletin 1264 entitled "Farm Manufacture of Unfermented Apple Juice," by Joseph S. Caldwell. This bulletin, which was published in 1924 and revised in 1938, is no longer available for distribution.

Unfermented apple juice, or sweet cider, was one of the first products prepared from apples. It was produced and consumed in greater quantities than any other fruit juice until about 1930, when extensive canning of fruit juices began in the United States. Since cider making is regarded by most fruit growers as a profitable outlet for surplus fruit, it is a widely distributed farm industry. Yearly production, which varies from year to year depending on the size of the crop, is now about ten million gallons.

While cider is used for making apple butter, jelly, and other products, its chief use is as a beverage. However, cider is generally regarded to be of a seasonal nature. This is attributable to the perishable nature of the unpasteurized juice.

The process of preparing and preserving unfermented apple juice is simple. The following pages give a few rules, and additional information to help the farmer obtain the best possible cider product from the material at hand.

APPLE VARIETIES

Selection of the fruit is very important. Culls may be used, but only fully matured, perfectly sound ones. The best processing methods will never make a high-grade juice from poor raw material. The fruit should be carefully inspected, and all defective apples removed. Fruit for later processing should be stored in the same manner as marketable fruit. Close watch should be maintained to prevent over-ripening of the fruit in storage. Blending of two or more varieties is advisable. Certain varieties have very distinct aroma and flavor characteristics, and the mixing of two or more of these will give a much more pleasing product. Apple varieties have been separated into the following five groups based on their suitability as cider material:

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1. Sweet subacid group. The varieties belonging to this group are grown primarily for dessert use; hence, they will probably furnish the producer with three-quarters to nine-tenths of his total available stock. Examples are the Baldwin, Hubbardston, Northwestern Greening, Rome Beauty, Stark, and Delicious.

2. Mildly acid to slightly tart group. This group consists of Winesap, Jonathan, Stayman, Northern Spy, and York Imperial, These at the proper stage of maturity yield juices nearest the ideal in single-variety unfermented beverage juices.

3. Aromatic group. These varieties are of great value in that they possess exceptional fragrance, aroma, and agreeable flavor, which are carried over into the cider. Delicious, Golden Delicious, Winter Banana, Ribston, and McIntosh make up this group.

4. Astringent group. The most difficult constituent to obtain in making high grade cider is tannin. It is obtained best by the addition of a small percentage of crab apples. Florence Hebernal, Red Siberian, Transcendent, and Martha are examples of desirable varieties. Since their juices are usually highly acidic, they have a two-fold value for blending.

5. Neutral group. This group is mentioned only to warn against their mediocre cider character. Ben Davis, Black Ben, Gano, and Willowtwig are included in this group. These varieties make no positive contribution to the product when used in blending, and care must be taken that their addition to the cider does not impair its quality.

PREPARATION OF CIDER

The amount, type, and cost of the equipment will, of course, vary with the quantity of apples to be processed. If only small quantities of cider are being made, a portable hand operated press will serve very nicely. If cider is to be made in volume or at different times of the apple season, it is best to have a place under roof so that work may continue regardless of the weather.

Cleanliness of the processing room, machinery, and fresh fruit both before and during processing cannot be overemphasized. An abundant supply of well water should be readily available to keep the raw material and processing facilities clean at all times. Steam is the best means of cleaning the machinery, but scrubbing with hot water is also satisfactory.

In small farm operations, the washing of apples may be done in a tank or large tub. The apples are dumped into the tank or tub, stirred thoroughly, and lifted out by hand. This method gives a good opportunity for inspection and elimination of defective fruit. Frequent changing of the wash water is advisable. In larger operations, the inspection belt usually precedes the washing tanks. Immediately after sorting and washing, the fruit should be ground and pressed.

The grinding and pressing are practically one continuous operation, and therefore, the two steps are usually carried out with one piece of equipment. Small commercial machines consist of a grater and a press mounted in a frame and operated by an electric motor.

The usual commercial press sizes are 17-inch, 22-inch, 32-inch, 36-inch, 42-inch, and 54-inch. Output and cost increase with increase in size of press.

A 17-inch press, capable of squeezing a "cheese" 17 inches square, will produce about 250 gallons of juice in a 10-hour day. The cost of a machine of this size (in 1955) is about $700.

The size of the press to be selected depends mainly on the volume of juice to be pressed. Most commercial cider presses come equipped with an adequate supply of press boards.

The fruit is prepared for pressing by building up several layers of ground fruit, each layer being wrapped in a special press cloth, and the layers separated by wooden racks. The press cloths should have dimensions approximately one and one-half times the dimensions of the racks with which they are to be used. Each of these cloth-wrapped layers is called a "cheese."

In loading, one press rack is laid on the pressing platform with a bottomless form surrounding it. Then a press cloth is laid over the form with corners of the cloth opposite the sides of the form rack. The form is then allowed to fill with apple pulp, with the top level and the corners well filled. The cloth is then folded over the pulp and the form removed. This makes the first of several layers or cheeses. A press board is then placed on this first layer and the second cheese is prepared. This procedure is repeated until the desired number of cheeses are obtained with press boards separating each cheese. Finally a press rack is placed on top of the last cheese; this completes the preparation for the pressing operation.

When using a hydraulic or mechanical press, the pressure should be built up gradually, to avoid rupturing the press cloths, until a pressure of approximately 150 pounds per square inch is applied for several minutes. It should be noted that most gauges show pressure on the ram and not the pressure per square inch on the cheese.

Dry press cloths should be soaked overnight in clear, cold water before using. The cloths must be kept clean at all times to permit a free flow of juice. This is done by boiling the cloths and then rinsing them in cold water. They can also be washed and then soaked in a weak chlorine solution to kill accumulated microorganisms. This last operation should be followed by a thorough rinsing to remove the chlorine solution from the cloths.

CONTAINERS AND JUICE SEDIMENTATION

As rapidly as the juice is pressed from the fruit, it should be placed in temporary storage vessels to permit sedimentation. Before sedimentation is started, the coarser particles of pulp should be removed by pouring the juice through a loosely woven cloth into the container. Closely woven cloths are useless, as they clog very quickly and do not remove a great deal of the fine material.

The containers should be filled to within 6 or 8 inches of the top and covered to keep out dirt and insects. The length of time for sedimentation will depend upon the character of the juice. Most properly made juices take 12 to 15 hours to settle, while some juices made from soft, overripe fruit may take 24 to 36 hours. If the temperature of the juice can be kept at 50°F. or less

during this stage, it may be safely held for 24 to 72 hours without danger of fermentation. At higher temperatures, it may not be possible to hold the juice for more than 6 to 8 hours before fermentation sets in.

When settling is completed, the juice must be drawn off without disturbing the sediment. The best way to do this is to bend a piece of glass, copper, or brass tubing into a J shape, attach a piece of rubber tubing to the long end of the J allowing the base of the J to rest on the bottom of the container, and start siphoning. The diameter of the tube and length of the sides of the J will depend on the size or type of container being used. The remaining juice may be filtered through several thicknesses of closely woven cloth and used as juice or made into vinegar.

Other methods of clarifying apple juice include heat treatment, centrifugation, filtration, and precipitation. However, most of these require expensive equipment and, therefore, will not be considered here.

PRESERVATION OF CIDER

Refrigeration: One of the most economical methods of cider preservation is refrigeration. If cider is cooled immediately after pressing and stored at a temperature between 32 and 36° F. it will retain its original flavor for 3 to 4 weeks without danger of fermentation. This procedure involves no additional labor and is relatively inexpensive, especially where cold storage facilities for fresh fruit are available.

If a refrigerated room is not available, an insulated metal or wooden tank can be installed and cooled by a small refrigeration unit. Many small orchards having roadside markets have operated very successfully by using this method.

Pasteurization: Cider preserved by heating will keep indefinitely without fermentation. When cider is preserved in this manner, there is some loss of the fresh flavor. It is often called pasteurized apple juice.

Two general methods of pasteurization have been developed for preserving fruit juices. The older and simpler procedure, called holding pasteurization, involves the use of relatively low pasteurization temperatures and an extended holding time. A temperature of 160° F. held for 15 to 20 minutes will give very satisfactory results. The juice may be heated in a large container to the desired temperature, filled into containers, and sealed; the containers are turned on their sides and held at the desired temperature for the required length of time before cooling. Another procedure for this same method is to fill the cold cider into the container, seal, and place the container in a water bath which is held a few degrees above the specified temperature. The holding time should start after the cider in the containers has reached 160° F. In filling the containers it should be remembered that considerable expansion occurs when a liquid is heated from room temperature to pasteurizing temperature. Be sure to allow for this expansion by leaving at least one-and one-half inches of air space between the top of the liquid and the top of the container.

Sealing before pasteurization is recommended for three reasons. (1) The substances which give the characteristic odor, or bouquet, to apple juice are partially lost when juice is heated in the open. In sealed containers the escape of these flavors is prevented, and they are reabsorbed by the juice upon cooling. (2) Any organisms on the inner surfaces of the rubbers and caps are killed during sterilization and no others can enter. (3) The necessity of more rapid handling of hot juice and glassware is dangerous to the operators and results in more spilling.

The second method is flash pasteurization, which involves heating the juice to a high temperature for a short period. This is accomplished by passing the juice through a coiled tube which is enclosed in a tubular iron pipe or in a large boiler. The apple juice flows through the coil and is heated by live steam or steam heated water, depending on the type of heat exchanger being used. The rate of passage is adjusted so that the juice comes out of the coil at a temperature of 175° to 180° F.

The hot juice should then be placed in preheated containers and sealed as quickly as possible. The container is then laid on its side so that the hot juice comes in contact with the cover. It is allowed to remain in this position for 3 to 5 minutes before being placed in a water bath for cooling. This method gives a higher quality product than the "holding" method and is the one most commonly used in large operations because of its adaptability to continuous operations.

Chemical Preservation: Sodium benzoate is not an ideal preservative for fresh cider. However, it is widely used and is relatively inexpensive. Most grades of sodium benzoate impart an objectionable "burning" taste to cider. Only the purest grade (U.S.P.) of benzoate should be used. Most State laws limit the concentration of benzoate added to cider to 1/10th of 1 percent by weight. This is equivalent to 7.0 ounces per 50 gallons of cider. Since benzoate does not dissolve readily in cold cider, 1 pound of dry powder should be dissolved in 1 gallon of warm cider. One pint of this solution will contain 2 ounces of benzoate, or enough for 14 gallons of cider.

It is necessary to declare both the presence of sodium benzoate and the amount added in percent by weight on the label of each container of cider offered for sale.

MANUFACTURERS OF CIDER EQUIPMENT*

Following are some of the companies that make cider equipment:

1. Buffalo Hammer Mill Corporation, 1044 Clinton Street, Buffalo, New York.
2. Dunning & Boschert Press Company, 382 W. Water Street, Syracuse, New York.
3. Orchard Equipment and Supply Company, Hill Street, Bristol, Connecticut.
4. Thomas-Albright Company, 600 Jefferson Street, Goshen, Indiana.

*THIS LISTING DOES NOT CONSTITUTE AN ENDORSEMENT BY THE UNITED STATES DEPARTMENT OF AGRICULTURE OVER OTHER COMPANIES NOT MENTIONED.

REFERENCES FOR ADDITIONAL INFORMATION

The following list is suggested for further information on this subject:

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